ANNUAL INDEX

The following index lists all the authors and articles that appeared in SCIENTIFIC AMERICAN *during 1977. Also indexed are "Mathematical Games" and "The Amateur Scientist."*

AUTHORS

Abt, Helmut A. THE COMPANIONS OF SUNLIKE STARS; April, page 96.

Adler, David. AMORPHOUS-SEMICONDUCTOR DEVICES; May, page 36.

Altschul, Siri von Reis. EXPLORING THE HERBARIUM; May, page 96.

Ambroggi, Robert P. UNDERGROUND RESERVOIRS TO CONTROL THE WATER CYCLE; May, page 21.

Appel, Kenneth, and Wolfgang Haken. THE SOLUTION OF THE FOUR-COLOR-MAP PROBLEM; October, page 108.

Benditt, Earl P. THE ORIGIN OF ATHEROSCLEROSIS; February, page 74.

Birley, Robin. A FRONTIER POST IN ROMAN BRITAIN; February, page 38.

Boore, David M. THE MOTION OF THE GROUND IN EARTHQUAKES; December, page 68.

Boyle, W. S. LIGHT-WAVE COMMUNICATIONS; August, page 40.

Brill, Winston J. BIOLOGICAL NITROGEN FIXATION; March, page 68.

Bryant, Peter J., Susan V. Bryant and Vernon French. BIOLOGICAL REGENERATION AND PATTERN FORMATION; July, page 66.

Bryant, Susan V., Peter J. Bryant and Vernon French. BIOLOGICAL REGENERATION AND PATTERN FORMATION; July, page 66.

Burke, Derek C. THE STATUS OF INTERFERON; April, page 42.

Byard, Margaret M. POETIC RESPONSES TO THE COPERNICAN REVOLUTION; June, page 120.

Capra, J. Donald, and Allen B. Edmundson. THE ANTIBODY COMBINING SITE; January, page 50.

Chapman, David S., and Henry N. Pollack. THE FLOW OF HEAT FROM THE EARTH'S INTERIOR; August, page 60.

Clark, George W. X-RAY STARS IN GLOBULAR CLUSTERS; October, page 42.

Cohen, Bernard L. THE DISPOSAL OF RADIOACTIVE WASTES FROM FISSION REACTORS; June, page 21.

Cole, Jonathan R., Stephen Cole and Leonard C. Rubin. PEER REVIEW AND THE SUPPORT OF SCIENCE; October, page 34.

Cole, Stephen, Leonard C. Rubin and Jonathan R. Cole. PEER REVIEW AND THE SUPPORT OF SCIENCE; October, page 34.

Cunningham, Bruce A. THE STRUCTURE AND FUNCTION OF HISTOCOMPATIBILITY ANTIGENS; October, page 96.

Dawson, T. J. KANGAROOS; August, page 78.

Dickman, Robert L. BOK GLOBULES; June, page 66.

Disney, Michael J., and Philippe Véron. BL LACERTAE OBJECTS; August, page 32.

Double, D. D., and A. Hellawell. THE SOLIDIFICATION OF CEMENT; July, page 82.

Drake, Elisabeth, and Robert C. Reid. THE IMPORTATION OF LIQUEFIED NATURAL GAS; April, page 22.

Dreesman, Gordon R., Joseph L. Melnick and F. Blaine Hollinger. VIRAL HEPATITIS; July, page 44.

Dye, James L. ANIONS OF THE ALKALI METALS; July, page 92.

Eddy, John A. THE CASE OF THE MISSING SUNSPOTS; May, page 80.

Edelson, B. I. GLOBAL SATELLITE COMMUNICATIONS; February, page 58.

Edmundson, Allen B., and J. Donald Capra. THE ANTIBODY COMBINING SITE; January, page 50.

Efron, Bradley, and Carl Morris. STEIN'S PARADOX IN STATISTICS; May, page 119.

Epel, David. THE PROGRAM OF FERTILIZATION; November, page 128.

Fiddes, John C. THE NUCLEOTIDE SEQUENCE OF A VIRAL DNA; December, page 54.

Flannelly, Kevin, and Richard Lore. RAT SOCIETIES; May, page 106.

French, Vernon, Peter J. Bryant and Susan V. Bryant. BIOLOGICAL REGENERATION AND PATTERN FORMATION; July, page 66.

Ginzberg, Eli. THE JOB PROBLEM; November, page 43.

Glucksberg, Sam, and Robert M. Krauss. SOCIAL AND NONSOCIAL SPEECH; February, page 100.

Gosling, J. T., and A. J. Hundhausen. WAVES IN THE SOLAR WIND; March, page 36.

Graham, L. C., Homer Jensen, Leonard J. Porcello and Emmett N. Leith. SIDE-LOOKING AIRBORNE RADAR; October, page 84.

Greengard, Paul, and James A. Nathanson. "SECOND MESSENGERS" IN THE BRAIN; August, page 108.

Grobstein, Clifford. THE RECOMBINANT-DNA DEBATE; July, page 22.

Groth, Edward J., P. James E. Peebles, Michael Seldner and Raymond M. Soneira. THE CLUSTERING OF GALAXIES; November, page 76.

Haken, Wolfgang, and Kenneth Appel. THE SOLUTION OF THE FOUR-COLOR-MAP PROBLEM; October, page 108.

Hammond, Norman. THE EARLIEST MAYA; March, page 116.

Harris, William F. DISCLINATIONS; December, page 130.

Hartmann, W. K. CRATERING IN THE SOLAR SYSTEM; January, page 84.

Hawking, S. W. THE QUANTUM MECHANICS OF BLACK HOLES; January, page 34.

Hellawell, A., and D. D. Double. THE SOLIDIFICATION OF CEMENT; July, page 82.

Hodges, David A. MICROELECTRONIC MEMORIES; September, page 130.

Hölldobler, Berthold K., and Edward O. Wilson. WEAVER ANTS; December, page 146.

Hollinger, F. Blaine, Joseph L. Melnick and Gordon R. Dreesman. VIRAL HEPATITIS; July, page 44.

Holton, William C. THE LARGE-SCALE INTEGRATION OF MICROELECTRONIC CIRCUITS; September, page 82.

Horowitz, Norman H. THE SEARCH FOR LIFE ON MARS; November, page 52.

Horridge, G. Adrian. THE COMPOUND EYE OF INSECTS; July, page 108.

Hundhausen, A. J., and J. T. Gosling. WAVES IN THE SOLAR WIND; March, page 36.

Inoué, Shinya, and Kayo Okazaki. BIOCRYSTALS; April, page 82.

Irwin, Howard S. THE HISTORY OF THE AIRFLOW CAR; August, page 98.

Jannasch, Holger W., and Carl O. Wirsen. MICROBIAL LIFE IN THE DEEP SEA; June, page 42.

Jensen, Homer, L. C. Graham, Leonard J. Porcello and Emmett N. Leith. SIDE-LOOKING AIRBORNE RADAR; October, page 84.

Kaplan, Martin M., and Robert G. Webster. THE EPIDEMIOLOGY OF INFLUENZA; December, page 88.

Kay, Alan C. MICROELECTRONICS AND THE PERSONAL COMPUTER; September, page 230.

Keeley, Lawrence H. THE FUNCTIONS OF PALEOLITHIC FLINT TOOLS; November, page 108.

Knuth, Donald E. ALGORITHMS; April, page 63.

Krauss, Robert M., and Sam Glucksberg. SOCIAL AND NONSOCIAL SPEECH; February, page 100.

Land, Edwin H. THE RETINEX THEORY OF COLOR VISION; December, page 108.

Leith, Emmett N., Homer Jensen, L. C. Graham and Leonard J. Porcello. SIDE-LOOKING AIRBORNE RADAR; October, page 84.

Leovy, Conway B. THE ATMOSPHERE OF MARS; July, page 34.

Lester, Henry A. THE RESPONSE TO ACETYLCHOLINE; February, page 106.

Levinson, Eugene, and Robert Sekuler. THE PERCEPTION OF MOVING TARGETS; January, page 60.

Lewit, Sarah, and Christopher Tietze. LEGAL ABORTION; January, page 21.

Lore, Richard, and Kevin Flannelly. RAT SOCIETIES; May, page 106.

McCosker, John E. FLASHLIGHT FISHES; March, page 106.

Maddin, Robert, James D. Muhly and Tamara S. Wheeler. HOW THE IRON AGE BEGAN; October, page 122.

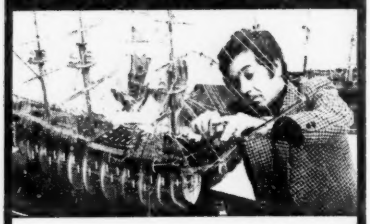
Mayo, John S. THE ROLE OF MICROELECTRONICS IN COMMUNICATION; September, page 192.

Mead, Carver A., and Ivan E. Sutherland. MICROELECTRONICS AND COM-

From Italy . . . The Ultimate in

HISTORIC SHIP REPLICA KITS

Frame and Plank Construction



World famous SERGAL and MANTUA kits: large magnificent replicas (up to 51" long) with beautiful walnut planking and components and cast-brass details. Virtually museum pieces when completed. Large-scale plans, English instructions, all materials included. Also, hundreds of other superb Italian kits, plans and accessories.

Send for our 88-page, full-color catalog, only $3.00 — refunded with your first order.

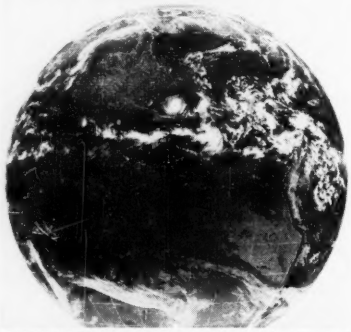
(For purchase of ships, major credit cards accepted.) Mail check to our new U.S. Warehouse address

MODEL EXPO, INC.
Dept. SA-12 / 230 Second Street
Dunellen, N.J. 08812

HURRICANE FILM SERIES

16mm TIME-LAPSE MOTION PICTURES of 1.5 YEARS OF WESTERN HEMISPHERE WEATHER photographed by SYNCHRONOUS METEOROLOGICAL SATELLITE — 2

19:45 03SE75 32A-2 0006-1640 FULL DISC IR



The **HURRICANE FILM SERIES** was created from about 25,000 infrared images like the one reproduced above; the 18-month weather spectacle plays in 60 minutes at silent movie speed. The field covered by the films includes the part of the image north of 5° S Lat, date-time annotation and the grey scale.

Enthusiastic commentary is now being offered by educators who have been viewing the **HURRICANE FILM SERIES.** For the first time, 3-dimensional atmospheric dynamics can be perceived on a global scale. Never before has such a spectacular, information-rich view of the World's weather been offered.

Specifications and prices for the SERIES are as follows: 16mm, Black and White, Silent.

"HURRICANE—1" Summer 1975 (May 12—Oct. 30) $(US) 145.00
"HURRICANE—2" Winter 75-76 (Oct. 31—May 15) $(US) 165.00
"HURRICANE—3" Summer 1976 (May 16—Nov. 15) $(US) 155.00
(Also available as video-tape cassettes. $150.00 each)

If a single film is of interest, the publisher recommends **"HURRICANE—3".** Notification of the publication of continuing films in the **HURRICANE SERIES** and information about developments in production of color-enhanced films will be sent on request.

Published by: The California Institute of Earth, Planetary and Life Sciences 12208 North East 137th Place Kirkland, Washington 98033 USA

The BikeBug.

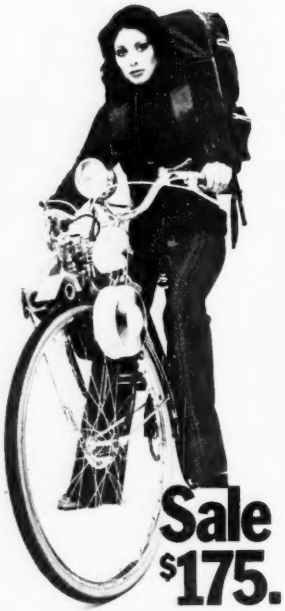
It's more than a moped at a third the price!

The BikeBug is an engine that fits any bike you already own, from a 10-speed racer to an adult tricycle; and creates a motorized bike better than mopeds costing *hundreds* of dollars more.

- 215 MPG....20 MPH!
- INSTALLS IN 10 MINUTES
- STARTS AUTOMATICALLY
- RUNS QUIETLY
- ALLOWS NORMAL PEDALING
- EXCLUSIVE 1-Yr. WARRANTY

Money-Back Guarantee!

Try a BikeBug for a week. If it doesn't perform as promised, return it. Full details with our brochure. Offer expires March 15, 1978.



Sale $175.

AquaBug International, Inc.

Dep't SC 100 Merrick Rd., Rockville Centre, N.Y., 11570 • (516) 536-8217

Name _____ Please Rush Me: ☐ Free Brochures.

Address _____ ☐ A BikeBug: $175, plus $10 Shipping costs.

City _____ ☐ MASTER CHARGE ☐ BANKAMERICARD/VISA

State _____ Zip _____ # _____ Exp. _____

(N.Y. Residents add tax) ☐ Check ☐ Cashier's Check ☐ Money Order

PUTER SCIENCE; September, page 210.

Meindl, James D. MICROELECTRONIC CIRCUIT ELEMENTS; September, page 70.

Melnick, Joseph L., Gordon R. Dreesman and F. Blaine Hollinger. VIRAL HEPATITIS; July, page 44.

Molnar, Peter, and Paul Tapponnier. THE COLLISION BETWEEN INDIA AND EURASIA; April, page 30.

Montgomery, G. Franklin. PRODUCT TECHNOLOGY AND THE CONSUMER; December, page 47.

Moorbath, Stephen. THE OLDEST ROCKS AND THE GROWTH O CONTINENTS; March, page 92.

Morris, Carl, and Bradley Efron. STEIN'S PARADOX IN STATISTICS; May, page 119.

Muhly, James D., Robert Maddin and Tamara S. Wheeler. HOW THE IRON AGE BEGAN; October, page 122.

Nathanson, James A., and Paul Greengard. "SECOND MESSENGERS" IN THE BRAIN; August, page 108.

Nef, John U. AN EARLY ENERGY CRISIS AND ITS CONSEQUENCES; November, page 140.

Noyce, Robert N. MICROELECTRONICS; September, page 62.

Nussenzveig, H. Moysés. THE THEORY OF THE RAINBOW; April, page 116.

Okazaki, Kayo, and Shinya Inoué. BIOCRYSTALS; April, page 82.

Old, Lloyd J. CANCER IMMUNOLOGY; May, page 62.

Oldham, William G. THE FABRICATION OF MICROELECTRONIC CIRCUITS; September, page 110.

Oliver, Bernard M. THE ROLE OF MICROELECTRONICS IN INSTRUMENTATION AND CONTROL; September, page 180.

Olton, David S. SPATIAL MEMORY; June, page 82.

Peebles, P. James E., Edward J. Groth, Michael Seldner and Raymond M. Soneira. THE CLUSTERING OF GALAXIES; November, page 76.

Phillipson, D. W. THE SPREAD OF THE BANTU LANGUAGE; April, page 106.

Pollack, Henry N., and David S. Chapman. THE FLOW OF HEAT FROM THE EARTH'S INTERIOR; August, page 60.

Porcello, Leonard J., Homer Jensen, L. C. Graham and Emmett N. Leith. SIDE-LOOKING AIRBORNE RADAR; October, page 84.

Rabinowicz, Ernest. EXOELECTRONS; January, page 74.

Reid, Robert C., and Elisabeth Drake. THE IMPORTATION OF LIQUEFIED NATURAL GAS; April, page 22.

Rowe, Ednor M., and John H. Weaver. THE USES OF SYNCHROTRON RADIATION; June, page 32.

Rubin, Leonard C., Stephen Cole and Jonathan R. Cole. PEER REVIEW AND THE SUPPORT OF SCIENCE; October, page 34.

Schwitters, Roy F. FUNDAMENTAL PARTICLES WITH CHARM; October, page 56.

Scoville, Jr., Herbert. THE SALT NEGOTIATIONS; August, page 24.
Sekuler, Robert, and Eugene Levinson. THE PERCEPTION OF MOVING TARGETS; January, page 60.
Seldner, Michael, Edward J. Groth, P. James E. Peebles and Raymond M. Soneira. THE CLUSTERING OF GALAXIES; November, page 76.
Sharon, Nathan. LECTINS; June, page 108.
Shoji, Kobe. DRIP IRRIGATION; November, page 62.
Siegel, Ronald K. HALLUCINATIONS; October, page 132.
Silverman, William A. THE LESSON OF RETROLENTAL FIBROPLASIA; June, page 100.
Simons, Elwyn L. RAMAPITHECUS; May, page 28.
Snyder, Solomon H. OPIATE RECEPTORS AND INTERNAL OPIATES; March, page 44.
Soneira, Raymond M., Edward J. Groth, P. James E. Peebles and Michael Seldner. THE CLUSTERING OF GALAXIES; November, page 76.
Stewart, Ian. GAUSS; July, page 122.
Sundberg, Johan. THE ACOUSTICS OF THE SINGING VOICE; March, page 82.
Sutherland, Ivan E., and Carver A. Mead. MICROELECTRONICS AND COMPUTER SCIENCE; September, page 210.
Talmon, Shemaryahu. THE SAMARITANS; January, page 100.
Tapponnier, Paul, and Peter Molnar. THE COLLISION BETWEEN INDIA AND EURASIA; April, page 30.
Terman, Lewis M. THE ROLE OF MICROELECTRONICS IN DATA PROCESSING; September, page 162.
Tietze, Christopher, and Sarah Lewit. LEGAL ABORTION; January, page 21.
Todd, Neil B. CATS AND COMMERCE; November, page 100.
Toong, Hoo-Min D. MICROPROCESSORS; September, page 146.
Triplett, Jr., Glover B., and David M. Van Doren, Jr. AGRICULTURE WITHOUT TILLAGE; January, page 28.
Tsipis, Kosta. CRUISE MISSILES; February, page 20.
Van Doren, Jr., David M., and Glover B. Triplett, Jr. AGRICULTURE WITHOUT TILLAGE; January, page 28.
Vendryes, Georges A. SUPERPHÉNIX: A FULL-SCALE BREEDER REACTOR; March, page 26.
Véron, Philippe, and M. J. Disney. BL LACERTAE OBJECTS; August, page 32.
Veverka, Joseph. PHOBOS AND DEIMOS; February, page 30.
Wainwright, Geoffrey. A CELTIC FARMSTEAD IN SOUTHERN BRITAIN; December, page 156.
Walsby, A. E. THE GAS VACUOLES OF BLUE-GREEN ALGAE; August, page 90.
Weaver, John H., and Ednor M. Rowe. THE USES OF SYNCHROTRON RADIATION; June, page 32.
Webster, Robert G., and Martin M. Kaplan. THE EPIDEMIOLOGY OF INFLUENZA; December, page 88.
Wheeler, Tamara S., Robert Maddin and James D. Muhly. HOW THE IRON AGE BEGAN; October, page 122.
Wilson, Edward O., and Berthold K. Hölldobler. WEAVER ANTS; December, page 146.
Wirsen, Carl O., and Holger W. Jannasch. MICROBIAL LIFE IN THE DEEP SEA; June, page 42.
Zare, Richard N. LASER SEPARATION OF ISOTOPES; February, page 86.

ARTICLES

ABORTION, LEGAL, by Christopher Tietze and Sarah Lewit; January, page 21.
ACETYLCHOLINE, THE RESPONSE TO, by Henry A. Lester; February, page 106.
AGRICULTURE WITHOUT TILLAGE, by Glover B. Triplett, Jr., and David M. Van Doren, Jr.; January, page 28.
AIRFLOW CAR, THE HISTORY OF THE, by Howard S. Irwin; August, page 98.
ALGORITHMS, by Donald E. Knuth; April, page 63.
ALKALI METALS, ANIONS OF THE, by James L. Dye; July, page 92.
AMORPHOUS-SEMICONDUCTOR DEVICES, by David Adler; May, page 36.
ANTIBODY COMBINING SITE, THE, by J. Donald Capra and Allen B. Edmundson; January, page 50.
ANTS, WEAVER, by Berthold K. Hölldobler and Edward O. Wilson; December, page 146.

It makes flash photography as easy as turning on a light.

Slip our Strobonar 280S onto your camera. Adjust its easy-to-use slide calculator to correspond to your ASA film speed. Marvel at how this electronic flash then does everything else for you, automatically selecting the precise amount of light for consistently superb flash photos. The incredible Strobonar 280S: ask to see it at any Rollei dealer.

STROBONAR
by Rollei

Honeywell Strobonar marketed by Rollei.

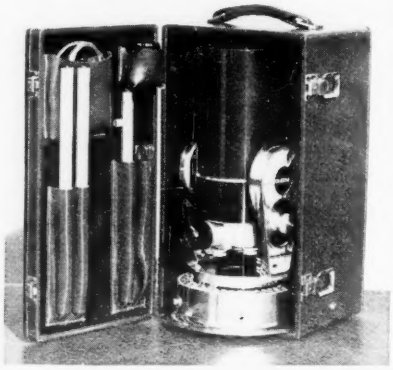
GIVE HER THE STARS FOR CHRISTMAS

A Questar is a gift for her Christmas that will go on giving. If she is that rare child with a true curiosity, it will help her to discover the nature of things all her life. It will be her own personal contact with the universe, which she will have the excitement of seeing, from her very first glimpse, through the finest of telescopes. Both optically and mechanically, Questar will respond rewardingly to her touch so that she will never know the frustration of an inferior tool. Questar's beauty and versatility will make it a cherished possession and an invaluable companion, whether her main interest becomes the study of the skies or an earth-oriented observing of nature close at hand. From her first-hand investigation will come an expanding awareness and continuing enjoyment. And Questar's easy portability will permit her to take it with her wherever she travels.

To open to such a young mind that vast store of knowledge to which she may one day make her own contribution, will be your rare privilege. So let it be a Questar this year for Christmas.

© Questar Corporation 1977

The Standard Questar with its beautiful star chart is shown above; at right is the Duplex Questar in the leather carrying case which complements both models.



QUESTAR, THE WORLD'S FINEST, MOST VERSATILE TELESCOPE IS PRICED FROM $925. SEND FOR OUR BOOKLET IN FULL COLOR WITH PHOTOGRAPHS BY QUESTAR OWNERS: $1 FOR MAILING ON THIS CONTINENT; BY AIR, TO S. AMERICA, $3; EUROPE AND AFRICA, $3.50; ELSEWHERE, $4.

QUESTAR

Box 20GS, New Hope, PA 18938
Phone: (215) 862-5277

ATHEROSCLEROSIS, THE ORIGIN OF, by Earl P. Benditt: February, page 74.
BANTU LANGUAGE, THE SPREAD OF THE, by D. W. Phillipson: April, page 106.
BIOCRYSTALS, by Shinya Inoué and Kayo Okazaki: April, page 82.
BIOLOGICAL REGENERATION AND PATTERN FORMATION, by Peter J. Bryant, Susan V. Bryant and Vernon French: July, page 66.
BLACK HOLES, THE QUANTUM MECHANICS OF, by S. W. Hawking: January, page 34.
BL LACERTAE OBJECTS, by Michael J. Disney and Philippe Véron: August, page 32.
BLUE-GREEN ALGAE, THE GAS VACUOLES OF, by A. E. Walsby: August, page 90.
BOK GLOBULES, by Robert L. Dickman: June, page 66.
BRAIN, "SECOND MESSENGERS" IN THE, by James A. Nathanson and Paul Greengard: August, page 108.
BREEDER REACTOR, SUPERPHÉNIX: A FULL-SCALE, by Georges A. Vendryes: March, page 26.
CANCER IMMUNOLOGY, by Lloyd J. Old: May, page 62.
CATS AND COMMERCE, by Neil B. Todd: November, page 100.
CELTIC FARMSTEAD IN SOUTHERN BRITAIN, A, by Geoffrey Wainwright: December, page 156.
CEMENT, THE SOLIDIFICATION OF, by D. D. Double and A. Hellawell: July, page 82.
CHARM, FUNDAMENTAL PARTICLES WITH, by Roy F. Schwitters: October, page 56.
COLLISION BETWEEN INDIA AND EURASIA, THE, by Peter Molnar and Paul Tapponnier: April, page 30.
COLOR VISION, THE RETINEX THEORY OF, by Edwin H. Land: December, page 108.
COPERNICAN REVOLUTION, POETIC RESPONSES TO THE, by Margaret M. Byard: June, page 120.
CRATERING IN THE SOLAR SYSTEM, by W. K. Hartmann: January, page 84.
CRUISE MISSILES, by Kosta Tsipis: February, page 20.
DISCLINATIONS, by William F. Harris: December, page 130.
EARTHQUAKES, THE MOTION OF THE GROUND IN, by David M. Boore: December, page 68.
ENERGY CRISIS AND ITS CONSEQUENCES, AN EARLY, by John U. Nef: November, page 140.
EXOELECTRONS, by Ernest Rabinowicz: January, page 74.
FERTILIZATION, THE PROGRAM OF, by David Epel: November, page 128.
FLASHLIGHT FISHES, by John E. McCosker: March, page 106.
FOUR-COLOR-MAP PROBLEM, THE SOLUTION OF THE, by Kenneth Appel and Wolfgang Haken: October, page 108.
GALAXIES, THE CLUSTERING OF, by Edward J. Groth, P. James E. Peebles, Michael Seldner and Raymond M. Soneira: November, page 76.

GAUSS, by Ian Stewart; July, page 122.
HALLUCINATIONS, by Ronald K. Siegel; October, page 132.
HEAT FROM THE EARTH'S INTERIOR, THE FLOW OF, by Henry N. Pollack and David S. Chapman; August, page 60.
HEPATITIS, VIRAL, by Joseph L. Melnick, Gordon R. Dreesman and F. Blaine Hollinger; July, page 44.
HERBARIUM, EXPLORING THE, by Siri von Reis Altschul; May, page 96.
HISTOCOMPATIBILITY ANTIGENS, THE STRUCTURE AND FUNCTION OF, by Bruce A. Cunningham; October, page 96.
INFLUENZA, THE EPIDEMIOLOGY OF, by Martin M. Kaplan and Robert G. Webster; December, page 88.
INSECTS, THE COMPOUND EYE OF, by G. Adrian Horridge; July, page 108.
INTERFERON, THE STATUS OF, by Derek C. Burke; April, page 42.
IRON AGE BEGAN, HOW THE, by Robert Maddin, James D. Muhly and Tamara S. Wheeler; October, page 122.
IRRIGATION, DRIP, by Kobe Shoji; November, page 62.
JOB PROBLEM, THE, by Eli Ginzberg; November, page 43.
KANGAROOS, by T. J. Dawson; August, page 78.
LASER SEPARATION OF ISOTOPES, by Richard N. Zare; February, page 86.
LECTINS, by Nathan Sharon; June, page 108.
LIGHT-WAVE COMMUNICATIONS, by W. S. Boyle; August, page 40.
MARS, THE ATMOSPHERE OF, by Conway B. Leovy; July, page 34.
MARS, THE SEARCH FOR LIFE ON, by Norman H. Horowitz; November, page 52.
MAYA, THE EARLIEST, by Norman Hammond; March, page 116.
MEMORY, SPATIAL, by David S. Olton; June, page 82.
MICROBIAL LIFE IN THE DEEP SEA, by Holger W. Jannasch and Carl O. Wirsen; June, page 42.
MICROELECTRONIC CIRCUIT ELEMENTS, by James D. Meindl; September, page 70.
MICROELECTRONIC CIRCUITS, THE FABRICATION OF, by William G. Oldham; September, page 110.
MICROELECTRONIC CIRCUITS, THE LARGE-SCALE INTEGRATION OF, by William C. Holton; September, page 82.
MICROELECTRONIC MEMORIES, by David A. Hodges; September, page 130.
MICROELECTRONICS, by Robert N. Noyce; September, page 62.
MICROELECTRONICS AND COMPUTER SCIENCE, by Ivan E. Sutherland and Carver A. Mead; September, page 210.
MICROELECTRONICS AND THE PERSONAL COMPUTER, by Alan C. Kay; September, page 230.
MICROELECTRONICS IN COMMUNICATION, THE ROLE OF, by John S. Mayo; September, page 192.
MICROELECTRONICS IN DATA PROCESSING,

Only once in a great while do you find a book of such beauty, wisdom and scope as

THE POWER OF PLANTS

by Brendan Lehane

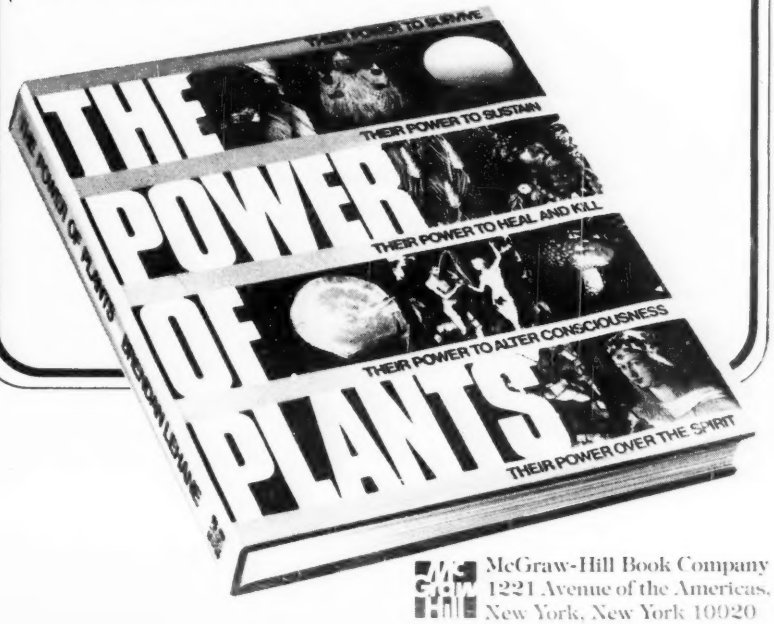
The most comprehensive text and iconography of plant life ever collected in one volume. Over 800 illustrations, about half in full color.

This is a book of great beauty, knowledge and power. The illustrations are as glorious and varied as plant life itself. They range from rare old drawings from ancient herbals to electron microscope photos. The text is a rare and witty combination of folk wisdom, how-to advice and scientific facts. No one who has ever known the joy of growing things should be without the book's ample diversions and instruction.

To read through its pages is to go from Alpine heights to the depths of the sea, from delicate edelweiss to jungle lianas. The life cycle of the earth, the life cycle of all animal life depends on the abundance of plants. You'll find plants that heal and kill, mind-altering plants, life-sustaining plants. You'll find a modern pharmacopoeia of nature's own medicines from hellebore for the heart to rosemary for rheumatism as well as remembrance. You'll discover the why's and how's of peyote, magic mushrooms, soma and mescaline.

The power of plants is full of unexpected facts and unperceived glories. As an illustration catches your eye, a nearby caption informs you that olive oil has vintages just like wine or that garlic makes roses smell better. This is a book to pick up again and again. It refreshes the mind and enriches the heart. Give it to every gardener, herbalist, plant freak, environmentalist, poisoner and lover of beautiful books you know.

$34.95 to December 31, 1977, $39.95 thereafter


THEIR POWER TO SUSTAIN
THEIR POWER TO HEAL AND KILL
THEIR POWER TO ALTER CONSCIOUSNESS
THEIR POWER OVER THE SPIRIT
THE POWER OF PLANTS
BRENDAN LEHANE

McGraw-Hill Book Company
1221 Avenue of the Americas,
New York, New York 10020

Read this and cry.

Froilan lives in the highlands of Guatemala in a one-room hut with dirt floors and no sanitary facilities. Labor there is so cheap that, for men like Froilan's father, hard work and long hours still mean a life of poverty. But now life is changing for Froilan.

Her name? We don't know. We found her wandering the streets of a large city in South America. Her mother is a beggar. What will become of this little girl? No one knows. In her country, she's just one of thousands doomed to poverty.

The world is full of children like these who desperately need someone to care, like the family who sponsors Froilan.

It costs them $15 a month, and it helps give Froilan so very much. Now he eats regularly. He gets medical care. He goes to school. Froilan writes to his sponsors and they write to him. They share something very special.

Since 1938 the Christian Children's Fund has helped hundreds of thousands of children. But so many more need your help. Become a sponsor. You needn't send any money now—you can "meet" the child assigned to your care first. Just fill out and mail the coupon. You'll receive the child's photograph, background information, and detailed instructions on how to write to the child. If you wish to sponsor the child, simply send in your first monthly check or money order for $15 within 10 days. If not, return the photo and other materials so we may ask someone else to help.

Take this opportunity to "meet" a child who needs your help. Somewhere in the world, there's a suffering child who will share something very special with you. Love.

For the love of a hungry child.

Dr. Verent J. Mills QSSADO
CHRISTIAN CHILDREN'S FUND, Inc., Box 26511, Richmond, Va. 23261
I wish to sponsor a ☐ boy ☐ girl. ☐ Choose any child who needs help.
Please send my information package today.
☐ I want to learn more about the child assigned to me. If I accept the child, I'll send my first sponsorship payment of $15 within 10 days. Or I'll return the photograph and other material so you can ask someone else to help.
☐ I prefer to send my first payment now, and I enclose my first monthly payment of $15.
☐ I cannot sponsor a child now but would like to contribute $_____.

Name _____

Address _____

City _____ State _____ Zip _____

Member of American Council of Voluntary Agencies for Foreign Service, Inc.
Gifts are tax deductible. Canadians: Write 1407 Yonge, Toronto, 7.
Statement of income and expenses available on request.

Christian Children's Fund, Inc.

THE ROLE OF, by Lewis M. Terman; September, page 162.

MICROELECTRONICS IN INSTRUMENTATION AND CONTROL, THE ROLE OF, by Bernard M. Oliver; September, page 180.

MICROPROCESSORS, by Hoo-Min D. Toong; September, page 146.

NATURAL GAS, THE IMPORTATION OF LIQUEFIED, by Elisabeth Drake and Robert C. Reid; April, page 22.

NITROGEN FIXATION, BIOLOGICAL, by Winston J. Brill; March, page 68.

NUCLEOTIDE SEQUENCE OF A VIRAL DNA, THE, by John C. Fiddes; December, page 54.

OLDEST ROCKS AND THE GROWTH OF CONTINENTS, THE, by Stephen Moorbath; March, page 92.

OPIATE RECEPTORS AND INTERNAL OPIATES, by Solomon H. Snyder; March, page 44.

PEER REVIEW AND THE SUPPORT OF SCIENCE, by Stephen Cole, Leonard C. Rubin and Jonathan R. Cole; October, page 34.

PERCEPTION OF MOVING TARGETS, THE, by Robert Sekuler and Eugene Levinson; January, page 60.

PHOBOS AND DEIMOS, by Joseph Veverka; February, page 30.

PRODUCT TECHNOLOGY AND THE CONSUMER, by G. Franklin Montgomery; December, page 47.

RADAR, SIDE-LOOKING AIRBORNE, by Homer Jensen, L. C. Graham, Leonard J. Porcello and Emmett N. Leith; October, page 84.

RAINBOW, THE THEORY OF THE, by H. Moysés Nussenzveig; April, page 116.

RAMAPITHECUS, by Elwyn L. Simons; May, page 28.

RAT SOCIETIES, by Richard Lore and Kevin Flannelly; May, page 106.

RECOMBINANT-DNA DEBATE, THE, by Clifford Grobstein; July, page 22.

RETROLENTAL FIBROPLASIA, THE LESSON OF, by William A. Silverman; June, page 100.

ROMAN BRITAIN, A FRONTIER POST IN, by Robin Birley; February, page 38.

SALT NEGOTIATIONS, THE, by Herbert Scoville, Jr.; August, page 24.

SAMARITANS, THE, by Shemaryahu Talmon; January, page 100.

SATELLITE COMMUNICATIONS, GLOBAL, by B. I. Edelson; February, page 58.

SOLAR WIND, WAVES IN THE, by J. T. Gosling and A. J. Hundhausen; March, page 36.

SPEECH, SOCIAL AND NONSOCIAL, by Robert M. Krauss and Sam Glucksberg; February, page 100.

STEIN'S PARADOX IN STATISTICS, by Bradley Efron and Carl Morris; May, page 119.

SUNLIKE STARS, THE COMPANIONS OF, by Helmut A. Abt; April, page 96.

SUNSPOTS, THE CASE OF THE MISSING, by John A. Eddy; May, page 80.

SYNCHROTRON RADIATION, THE USES OF, by Ednor M. Rowe and John H.

Weaver; June, page 32.
TOOLS, THE FUNCTIONS OF PALEOLITHIC FLINT, by Lawrence H. Keeley; November, page 108.
VOICE, THE ACOUSTICS OF THE SINGING, by Johan Sundberg; March, page 82.
WASTES FROM FISSION REACTORS, THE DISPOSAL OF RADIOACTIVE, by Bernard L. Cohen; June, page 21.
WATER CYCLE, UNDERGROUND RESERVOIRS TO CONTROL THE, by Robert P. Ambroggi; May, page 21.
X-RAY STARS IN GLOBULAR CLUSTERS, by George W. Clark; October, page 42.

MATHEMATICAL GAMES

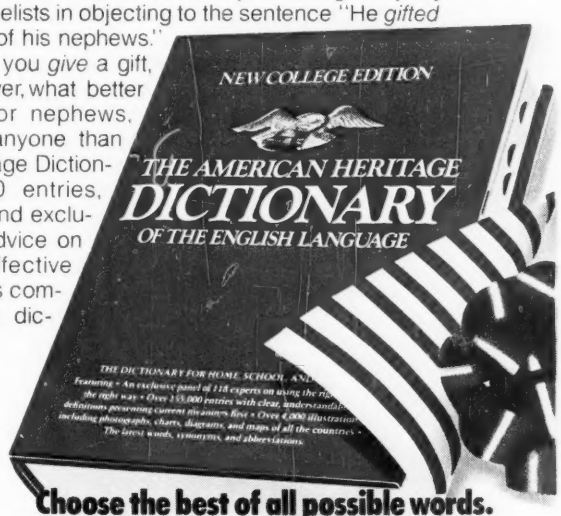
Cipher that would take millions of years to break, A new kind of; August, page 120.
Cutting things into equal parts leads into significant areas of mathematics; July, page 132.
Hyperbola, On conic sections, ruled surfaces and other manifestations of the; September, page 24.
Joining sets of points by lines leads into diverse (and diverting) paths, In which; November, page 18.
"Jump proof" and its similarity to the toppling of a row of dominoes, The; May, page 128.
Matrix goes to California to apply punk to rock study, Dr.; December, page 17.
Negative numbers and the difficulty of grasping it, The concept of; June, page 131.
New Eleusis, the game that simulates the search for truth, On playing; October, page 18.
Numbers, Cornering a queen leads unexpectedly into corners of the theory of; March, page 134.
Pool-table triangle, a limerick paradox and divers other challenges, The; April, page 129.
Tiles, Extraordinary nonperiodic tiling that enriches the theory of; January, page 110.
Wordplay, The flip-strip sonnet, the lipogram and other mad modes of; February, page 121.

THE AMATEUR SCIENTIST

Drops of water dance on a hot skillet and the experimenter walks on hot coals; August, page 126.
Hot water freezes faster than cold water. Why does it do so?; September, page 246.
Physics that can be found in a cup of coffee or tea, Wonders of; November, page 152.
Polarized light with quarter-wave and half-wave plates of one's own making, Studying; December, page 172.
Rainbows in a single drop of water, How to create and observe a dozen; July, page 138.
Salt fountain and other curiosities based on the different density of fluids, The; October, page 142.

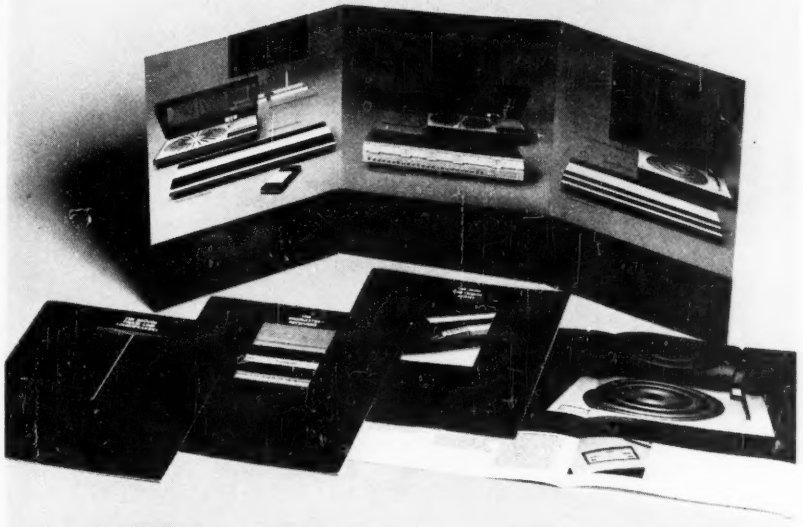
Why Edwin Newman believes it is better to give than to gift.

As Chairman of The American Heritage Dictionary Usage Panel, Edwin Newman joins a large majority of panelists in objecting to the sentence "He *gifted* each of his nephews." When you *give* a gift, however, what better one for nephews, nieces, or almost anyone than The American Heritage Dictionary? With 155,000 entries, 4,000 illustrations, and exclusive Usage Panel advice on new words and effective usage, it's America's complete contemporary dictionary. From $9.95.



Choose the best of all possible words.
Published by Houghton Mifflin Company • Two Park Street • Boston, Mass. 02107

DISCOVER



BANG & OLUFSEN

WRITE FOR LITERATURE.
BANG & OLUFSEN OF AMERICA · DEPARTMENT 13C · 515 BUSSE ROAD · ELK GROVE VILLAGE, IL 60007

BIBLIOGRAPHY

Readers interested in further explanation of the subjects covered by the articles in this issue may find the following lists of publications helpful.

MATHEMATICAL GAMES

A CONSECUTIVE-DIGIT PRIME. Joseph S. Madachy in *Journal of Recreational Mathematics*, Vol. 4, No. 2, page 100; April, 1971.

CONSECUTIVE-DIGIT PRIMES—AGAIN. Joseph S. Madachy in *Journal of Recreational Mathematics*, Vol. 5, No. 4, pages 253–254; October, 1972.

CONSECUTIVE-DIGIT PRIMES (ROUND 3). Raphael Finkelstein and Judy Leybourne in *Journal of Recreational Mathematics*, Vol. 6, No. 3, pages 204–206; Summer, 1973.

THE JUPITER EFFECT. John R. Gribbin and Stephen H. Plagemann. Macmillan, 1974.

PRODUCT TECHNOLOGY AND THE CONSUMER

PATTERNS OF ENERGY CONSUMPTION IN THE UNITED STATES. Stanford Research Institute, prepared for the Office of Science and Technology, Executive Office of the President. Government Printing Office, January, 1972.

PRODUCT PERFORMANCE IN AN AFFLUENT SOCIETY. Lewis M. Branscomb in *Product Quality, Performance, and Cost: A Report and Recommendations Based on a Symposium and Workshops Arranged by the National Academy of Engineering at the Seventh Annual Meeting, April 29 and 30, 1971*. National Academy of Engineering, 1972.

SERVICE-LIFE EXPECTANCY OF HOUSEHOLD APPLIANCES: NEW ESTIMATES FROM THE USDA. Marilyn Doss Ruffin and Katherine S. Tippett in *Home Economics Research Journal*, Vol. 3, No. 3, pages 159–170; March, 1975.

THE NUCLEOTIDE SEQUENCE OF A VIRAL DNA

A RAPID METHOD FOR DETERMINING SEQUENCES IN DNA BY PRIMED SYNTHESIS WITH DNA POLYMERASE. Frederick Sanger and Alan R. Coulson in *Journal of Molecular Biology*, Vol. 94, No. 3, pages 441–448; May 25, 1975.

OVERLAPPING GENES IN BACTERIOPHAGE φX174. B. G. Barrell, G. M. Air and C. A. Hutchison III in *Nature*, Vol. 264, No. 5581, pages 34–41; November 4, 1976.

NUCLEOTIDE SEQUENCE OF BACTERIOPHAGE ΦX174 DNA. Frederick Sanger, G. M. Air, B. G. Barrell, N. L. Brown, Alan R. Coulson, John C. Fiddes, C. A. Hutchison III, P. M. Slocombe and M. Smith in *Nature*, Vol. 265, No. 5595, pages 687–695; February 24, 1977.

THE MOTION OF THE GROUND IN EARTHQUAKES

ELEMENTARY SEISMOLOGY. Charles F. Richter. W. H. Freeman and Company, 1958.

MECHANISM OF THE CHILEAN EARTHQUAKES OF MAY 21 AND 22, 1960. George Plafker and J. C. Savage in *Geological Society of America Bulletin*, Vol. 81, No. 4, pages 1001–1030; April, 1970.

EARTHQUAKE SHAKING AND DAMAGE TO BUILDINGS. Robert A. Page, John A. Blume and William B. Joyner in *Science*, Vol. 189, No. 4203, pages 601–608; August 22, 1975.

STRONG-MOTION RECORDINGS OF THE CALIFORNIA EARTHQUAKE OF APRIL 18, 1906. David M. Boore in *Bulletin of the Seismological Society of America*, Vol. 67, No. 3, pages 561–577; June, 1977.

THE EPIDEMIOLOGY OF INFLUENZA

THE GREAT EPIDEMIC. Adolph A. Hoehling. Little, Brown & Co., 1961.

THE INFLUENZA VIRUSES AND INFLUENZA. Edited by Edwin D. Kilbourne. Academic Press, Inc., 1975.

EPIDEMIC AND PEACE, 1918. Alfred W. Crosby, Jr. Greenwood Press, 1976.

THE RETINEX THEORY OF COLOR VISION

COLOR VISION AND THE NATURAL IMAGE: PART I. Edwin H. Land in *Proceedings of the National Academy of Sciences*, Vol. 45, No. 1, pages 115–129; January, 1959.

COLOR VISION AND THE NATURAL IMAGE: PART II. Edwin H. Land in *Proceedings of the National Academy of Sciences*, Vol. 45, No. 4, pages 636–644; April, 1959.

INTERACTION OF THE LONG-WAVE CONES AND THE RODS TO PRODUCE COLOR SENSATIONS. John J. McCann and Jeanne L. Benton in *Journal of the Optical Society of America*, Vol. 59, No. 1, pages 103–107; January, 1969.

LIGHTNESS AND RETINEX THEORY. Edwin H. Land and John J. McCann in *Journal of the Optical Society of America*, Vol. 61, No. 1, pages 1–11; January, 1971.

DISCLINATIONS

CRYSTAL DISLOCATIONS: ELEMENTARY CONCEPTS AND DEFINITIONS. F. C. Frank in *The Philosophical Magazine: A Journal of Theoretical, Experimental and Applied Physics*, Vol. 42, No. 331, pages 809–819; August, 1951.

THEORY OF CRYSTAL DISLOCATIONS. Frank R. N. Nabarro. Clarendon Press, 1967.

THE GEOMETRY OF DISCLINATIONS IN CRYSTALS. William F. Harris in *Surface and Defect Properties of Solids, Vol. 3: A Review of the Recent Literature Published up to April, 1973*. The Chemical Society, London, 1974.

NEGATIVE WEDGE DISCLINATIONS OF ROTATION 2π RADIANS AND TOPOLOGICAL CHANGES OF MEMBRANOUS SYSTEMS. William F. Harris in *The Philosophical Magazine: A Journal of Theoretical, Experimental and Applied Physics*, Vol. 32, No. 1, pages 37–41; July, 1975.

WEAVER ANTS

THE INSECT SOCIETIES. Edward O. Wilson. The Belknap Press of Harvard University Press, 1971.

WEAVER ANTS: SOCIAL ESTABLISHMENT AND MAINTENANCE OF TERRITORY. Berthold K. Hölldobler and Edward O. Wilson in *Science*, Vol. 195, No. 4281, pages 900–902; March 4, 1977.

COLONY-SPECIFIC TERRITORIAL PHEROMONE IN THE AFRICAN WEAVER ANT *OECOPHYLLA LONGINODA* (LATREILLE). Berthold K. Hölldobler and Edward O. Wilson in *Proceedings of the National Academy of Sciences*, Vol. 74, No. 5, pages 2072–2075; May, 1977.

A CELTIC FARMSTEAD IN SOUTHERN BRITAIN

EXCAVATIONS AT LITTLE WOODBURY, WILTSHIRE, PART I: THE SETTLEMENT REVEALED BY EXCAVATION. Gerhardt Bersu in *Proceedings of the Prehistoric Society*, Vol. 6, pages 30–111; 1940.

THE IRON AGE SETTLEMENT OF GUSSAGE ALL SAINTS. Geoffrey Wainwright and Mansel G. Spratling in *Antiquity*, Vol. 47, pages 109–130; 1973.

IRON AGE COMMUNITIES IN BRITAIN: AN ACCOUNT OF ENGLAND, SCOTLAND AND WALES FROM THE SEVENTH CENTURY B.C. UNTIL THE ROMAN CONQUEST. Barry Cunliffe. Routledge & Kegan Paul, 1974.

THE IRON AGE IN LOWLAND BRITAIN. Derek W. Harding. Routledge & Kegan Paul, 1974.

THE AMATEUR SCIENTIST

POLARIZED LIGHT. William A. Shurcliffe and Stanley S. Ballard. D. Van Nostrand Company, 1964.

WAVES. Frank S. Crawford. McGraw-Hill Book Company, 1968.

HAIDINGER'S BRUSHES AND PREDOMINANT ORIENTATION OF COLLAGEN IN CORNEAL STROMA. C. C. D. Shute in *Nature*, Vol. 250, No. 5462, pages 163–164; July 12, 1974.